

# STATISTICS

|      |                                                         |                                                                                                                                                                                                                                                                           |
|------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Course Title:                                           | STATISTICS                                                                                                                                                                                                                                                                |
| 2    | Course Code:                                            | MAK2037                                                                                                                                                                                                                                                                   |
| 3    | Type of Course:                                         | Compulsory                                                                                                                                                                                                                                                                |
| 4    | Level of Course:                                        | First Cycle                                                                                                                                                                                                                                                               |
| 5    | Year of Study:                                          | 2                                                                                                                                                                                                                                                                         |
| 6    | Semester:                                               | 3                                                                                                                                                                                                                                                                         |
| 7    | ECTS Credits Allocated:                                 | 3.00                                                                                                                                                                                                                                                                      |
| 8    | Theoretical (hour/week):                                | 2.00                                                                                                                                                                                                                                                                      |
| 9    | Practice (hour/week):                                   | 0.00                                                                                                                                                                                                                                                                      |
| 10   | Laboratory (hour/week):                                 | 0                                                                                                                                                                                                                                                                         |
| 11   | Prerequisites:                                          |                                                                                                                                                                                                                                                                           |
| 12   | Language:                                               | Turkish                                                                                                                                                                                                                                                                   |
| 13   | Mode of Delivery:                                       | Face to face                                                                                                                                                                                                                                                              |
| 14   | Course Coordinator:                                     | Prof. Dr. MUHSİN KILIÇ                                                                                                                                                                                                                                                    |
| 15   | Course Lecturers:                                       |                                                                                                                                                                                                                                                                           |
| 16   | Contact information of the Course Coordinator:          | mkilic@uludag.edu.tr                                                                                                                                                                                                                                                      |
| 17   | Website:                                                |                                                                                                                                                                                                                                                                           |
| 18   | Objective of the Course:                                | Students are expected to learn a basic understanding of data analysis and statistical concepts, in order to be able to think critically about the quantitative information they encounter every day.                                                                      |
| 19   | Contribution of the Course to Professional Development: | Distinguish between different types of data.<br>Interpret examples of methods for summarising data sets, including common graphical tools (such as boxplots, histograms and stemplots) and summary statistics<br>Identify the features that describe a data distribution. |
| 20   | Learning Outcomes:                                      |                                                                                                                                                                                                                                                                           |
|      | 1                                                       | Presents the data by visualizing them with graphic methods;                                                                                                                                                                                                               |
|      | 2                                                       | Can sort the data numerically with the help of various statistical parameters,                                                                                                                                                                                            |
|      | 3                                                       | Able to know the basic concepts of probability.                                                                                                                                                                                                                           |
|      | 4                                                       | Uses curve fitting techniques for given data.                                                                                                                                                                                                                             |
|      | 5                                                       | Knows sampling type and techniques in data collection.                                                                                                                                                                                                                    |
|      | 6                                                       | Can estimate population mean and sample proportions                                                                                                                                                                                                                       |
|      | 7                                                       | Can use test hypothesis methods                                                                                                                                                                                                                                           |
|      | 8                                                       |                                                                                                                                                                                                                                                                           |
|      | 9                                                       |                                                                                                                                                                                                                                                                           |
|      | 10                                                      |                                                                                                                                                                                                                                                                           |
| 21   | Course Content:                                         |                                                                                                                                                                                                                                                                           |
|      | Course Content:                                         |                                                                                                                                                                                                                                                                           |
| Week | Theoretical                                             | Practice                                                                                                                                                                                                                                                                  |

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|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------------|------------------------|
| 1                                                    | Defining general statistical concepts such as variable, sample, population<br>Classification of variables<br>Graphical representation of quantitative variables and interpretation of graphs<br>Relative frequency histograms                                                                                                 |        |                 |                        |
| 2                                                    | Defining numerical parameters such as arithmetic mean, median, mode in which the center is measured and interpreting the distributions by comparing the parameters<br>Defining numerical parameters that determine the variability of the distribution, such as variance and standard deviation.<br>Box representation method |        |                 |                        |
| 3                                                    | Determining the direction and direction of the relationship between variables by defining the correlation coefficient<br>Introduction of the linear curve fitting (regression) method                                                                                                                                         |        |                 |                        |
| 4                                                    | Introducing the basic concepts of probability<br>The use of count rule and product rule in calculating probabilities<br>Permutation and combination<br>Conditional probability, aggregate probability and Bayes' laws                                                                                                         |        |                 |                        |
| 5                                                    | Binomial probability distributions<br>Poisson random variable<br>Hypergeometric probability distribution                                                                                                                                                                                                                      |        |                 |                        |
| 6                                                    | Reading the standard normal distributions                                                                                                                                                                                                                                                                                     |        |                 |                        |
| Activites                                            |                                                                                                                                                                                                                                                                                                                               | Number | Duration (hour) | Total Work Load (hour) |
| 7                                                    | Sample question solution                                                                                                                                                                                                                                                                                                      | 14     | 2.00            | 28.00                  |
| Practicals/Labs                                      |                                                                                                                                                                                                                                                                                                                               | 0      | 0.00            | 0.00                   |
| 9                                                    | Central limit theorem<br>Calculation of probabilities for sample mean                                                                                                                                                                                                                                                         | 14     | 4.50            | 63.00                  |
| Homeworks                                            |                                                                                                                                                                                                                                                                                                                               | 0      | 0.00            | 0.00                   |
| Projects                                             | distribution and binomial distribution                                                                                                                                                                                                                                                                                        | 0      | 0.00            | 0.00                   |
| Field Studies                                        |                                                                                                                                                                                                                                                                                                                               | 0      | 0.00            | 0.00                   |
| Midterm Exams                                        | Estimating the success rate of the binomial distribution using the confidence interval method                                                                                                                                                                                                                                 | 1      | 1.00            | 1.00                   |
| Others                                               |                                                                                                                                                                                                                                                                                                                               | 0      | 0.00            | 0.00                   |
| Final Exams                                          | Estimation of the difference between two means using the confidence interval method                                                                                                                                                                                                                                           | 1      | 1.00            | 1.00                   |
| Total Work Load                                      |                                                                                                                                                                                                                                                                                                                               |        |                 | 93.00                  |
| Total work load using the confidence interval method |                                                                                                                                                                                                                                                                                                                               |        |                 | 3.10                   |
| ECTS Credit of the Course                            |                                                                                                                                                                                                                                                                                                                               |        |                 | 3.00                   |
| 11                                                   | Large sample ( $n > 30$ ) hypothesis testing method<br>One-way and two-way hypothesis tests<br>Types of errors in test statistics method                                                                                                                                                                                      |        |                 |                        |
| 12                                                   | Large sample hypothesis testing of the difference between two means<br>Hypothesis testing in binomial probability distributions<br>Big sample hypothesis testing of the difference between the two success rates                                                                                                              |        |                 |                        |

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| <b>13</b> | Small sample (n <30) hypothesis testing method<br>Completing the t distribution and reading the probabilities from the t table<br>Estimation of the population mean by small sample hypothesis testing<br>Estimating the difference between the small sample hypothesis test and the two population means<br>Paired difference tests |  |
| <b>14</b> | Sample question solution                                                                                                                                                                                                                                                                                                             |  |

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| <b>22</b> | Textbooks, References and/or Other Materials: | <p>Introduction to probability and statistics lecture notes, solved questions and slides, Prof. Dr. Muhsin Kılıç.</p> <p>Statistics, 3rd Ed., M.R. Spiegel, I.j. Stephens. Schaums Outline Series Mc Graw-Hill, New York, 1999.</p> <p>Applied Statistics, S. Özer, Filiz Kitapevi, İstanbul 1996.</p> <p>Introduction to Probability and Statistics, 3rd Ed., Wadsworth, California, 1971.</p> |
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| <b>23</b> | Assesment |  |
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| TERM LEARNING ACTIVITIES                                         |  | NUMBER | WEIGHT                                                                                                                               |
|------------------------------------------------------------------|--|--------|--------------------------------------------------------------------------------------------------------------------------------------|
| Midterm Exam                                                     |  | 1      | 40.00                                                                                                                                |
| Quiz                                                             |  | 0      | 0.00                                                                                                                                 |
| Home work-project                                                |  | 0      | 0.00                                                                                                                                 |
| Final Exam                                                       |  | 1      | 60.00                                                                                                                                |
| Total                                                            |  | 2      | 100.00                                                                                                                               |
| Contribution of Term (Year) Learning Activities to Success Grade |  |        | 40.00                                                                                                                                |
| Contribution of Final Exam to Success Grade                      |  |        | 60.00                                                                                                                                |
| Total                                                            |  |        | 100.00                                                                                                                               |
| Measurement and Evaluation Techniques Used in the Course         |  |        | Measurement and evaluation are performed according to the Rules & Regulations of Bursa Uludağ University on Undergraduate Education. |

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| <b>24</b> | <b>ECTS / WORK LOAD TABLE</b> |  |
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| <b>25</b>  | <b>CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS</b> |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |
|------------|----------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
|            | PQ1                                                                  | PQ2 | PQ3 | PQ4 | PQ5 | PQ6 | PQ7 | PQ8 | PQ9 | PQ10 | PQ11 | PQ12 | PQ13 | PQ14 | PQ15 | PQ16 |
| <b>ÖK1</b> | 5                                                                    | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| <b>ÖK2</b> | 5                                                                    | 3   | 3   | 0   | 0   | 0   | 0   | 2   | 0   | 2    | 0    | 2    | 0    | 2    | 0    | 0    |
| <b>ÖK3</b> | 4                                                                    | 3   | 3   | 2   | 5   | 2   | 2   | 2   | 0   | 2    | 0    | 2    | 0    | 1    | 0    | 0    |
| <b>ÖK4</b> | 5                                                                    | 5   | 3   | 3   | 2   | 2   | 1   | 3   | 0   | 1    | 1    | 2    | 1    | 2    | 0    | 0    |
| <b>ÖK5</b> | 5                                                                    | 3   | 2   | 2   | 1   | 1   | 1   | 3   | 0   | 1    | 1    | 1    | 1    | 1    | 0    | 0    |
| <b>ÖK6</b> | 3                                                                    | 3   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 1    | 1    | 1    | 1    | 1    | 0    | 0    |
| <b>ÖK7</b> | 4                                                                    | 3   | 2   | 4   | 5   | 1   | 2   | 2   | 0   | 1    | 1    | 1    | 1    | 1    | 0    | 0    |

| LO: Learning Objectives    PQ: Program Qualifications |            |       |          |        |             |
|-------------------------------------------------------|------------|-------|----------|--------|-------------|
| Contrib<br>ution<br>Level:                            | 1 very low | 2 low | 3 Medium | 4 High | 5 Very High |